
* MONOGRAPH NO.: M1D

ITEM: MRE Packaging, General

NSN: Not applicable.

ITEM SPECIFICATION: Not applicable.

APPROXIMATE CALORIC VALUE: Not applicable.

CHARACTERISTICS OF ITEM: Most of the food components of the MRE are packaged in flexible packages. Some of the packages are the same or very similar to those used for previous types of operational ration components (e.g., cream substitute, instant coffee, and gum). Others are newer forms of packaging technology such as the vacuum packed; trilaminate, nonretortable pouch, and the trilaminate, retortable pouch. The only food component not in a flexible package is the hot pepper sauce component which was introduced to the MRE in 1987. Since almost all of the primary and secondary components of the MRE are packaged in trilaminate pouches, these will be the primary concern of this Monograph.

The retortable pouch, often referred to as the flexible can, is what brought the MRE to fruition in 1980. It is fabricated as a three-ply laminate consisting of, from inside to outside, 0.003 to 0.004 inch thick polyolefin, 0.00035 to 0.0007 inch thick aluminum foil, and 0.0005 inch thick polyester. When fabricated in accordance with specification MIL-P-44073, it should be able to withstand thermal processing (retort processing) and a wide temperature range sufficient to preclude damage during transportation and storage. Coloring is applied to either the exterior or interior surface of the polyester lamina. While the pouch is considered a "tough" package, it is by no means indestructible.

The strength of the pouch and its resistance to damage comes from its trilaminar structure. Each of the three laminas has its own individual qualities that contribute to the success of the pouch. Individually, none is capable of providing all the essential attributes required of a package that undergoes the rigors of military handling, storage, and distribution. The outer layer of polyester provides strength and resistance to tearing. The aluminum foil laminate (middle layer) provides an almost absolute barrier to the transfer of gases (especially oxygen) and water vapor between the environment and the product in the pouch. The inner layer of polyolefin provides an inert product contact surface and is a heat sealable material essential for attaining a hermetic seal. The trilaminar structure is so reliant on the synergism of the three layers, that the failure of one or more layers including delamination of one of the layers from another causes the pouch to be unserviceable or questionable in its integrity. One of the primary problems with the pouch is that it is prone to puncture by sharp objects both from external sources (e.g., grains of sand, gravel, twigs) and from internal sources (e.g., ice crystals of frozen product). To combat external sources of damage, the retort pouch is placed in a secondary package once called a folder and now referred to as a carton. The carton protects it from externally induced abuses and its integrity is extremely important as a result.

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Those foods that are packaged in retort pouches rely on heat processing and package integrity for their shelf stabilization and protection against pathogenic and non-pathogenic microbial growth. The retort pouch carton is an essential part of the MRE packaging system.

The primary difference between the retort pouch and the non-retort pouch is the fact that the adhesive(s) used to laminate or bond the layers of the retort pouch together are extremely heat resistant while the adhesives used for the non-retortable pouches are much less heat resistant and consequently much less costly. Examples of food components packaged in non-retortable, trilaminar pouches are the jellies, the cheese and peanut butter, and the freeze dehydrated fruits (the latter also being vacuum packed).

Other components such as the beverage bases, candies, condiments, and the spoon are all packaged in flexible packages of various styles and types. The only component packed in a glass bottle at the time of this writing is the hot pepper sauce. The bottle is a must if the soldier is to receive the hot sauce as part of the menu because flexible packages for this item are either not available or not practical at the present time. Research is ongoing in quest of a flexible package for hot sauce that has sufficient barrier properties to protect the item from the extremes of time/temperature abuse which the MRE is routinely exposed to.

One of the most important factors concerning the packaging of the MRE components is the information that is printed on the package itself. For example, most entree and vegetable pouches contain numerous required markings. They include the product name, date of pack into the pouch, the official establishment number, the lot number, production shift number, retort identification number, retort cook number, and the hot-fill equipment identification number. Beginning with dates of pack 1988 and later, almost every one of the components in a meal will be Julian Date coded in addition to the traditional markings. It is essential that inspectors as well as soldiers extract as much information from the component package as possible when a problem arises, during an inspection and/or while the product is being consumed. All too often reports/complaints are received where the only information received is that from the shipping container.

The MRE shipping container has required markings that are essential, but by themselves are not sufficient to track down the cause of a component problem. For example, lot 22 of assembled rations may contain only one component lot of an entree or (as is more often the case) it may contain two, three or even thirty or more component lots of one particular entree. In the latter case, if only the assembly lot number is received, it is impossible to know which one of the component lots should be investigated. The bottom line is that the inspection form that accompanies this Appendix must be completely filled out during inspections and while investigating a complaint.

DEFECTS LIKELY TO OCCUR: Tears, cuts, holes and, when applicable, inadequate vacuum are the most often encountered defects in MRE component packaging. Delamination is also a defect often encountered in laminated packages. It is the separation of one laminate (i.e., one layer) from another.

Its significance varies depending on the area of the pouch that is delaminated (e.g., the body of the pouch or the seal area) and the extent of the delamination. Specific defects and inspection guidance for each type component are addressed in the component Monographs.

UNIQUE EXAMINATION/TEST PROCEDURES: To check for minute tears, cuts or holes in any package, insert a pocket flashlight inside the package while in a dark room. This usually aids in identifying the location of the defects. Refer to component Monographs for other procedures.

SPECIAL NOTES: Due to the color and glossy finish characteristic of MRE retort and non-retort pouches, tiny tears, cuts, and holes are often impossible or at best extremely difficult to see with the naked eye. At the point of origin, retort item lots are subjected to zyglo dye testing to detect microscopic holes that are not easily discernible with the naked eye and microscopic holes that by definition cannot be seen with the naked eye. This test is also available to inspectors in the field and should be requested of the supporting laboratory if the integrity of pouches is in question.